Alternate Forms Reliability of the Behavioral Relaxation Scale: Preliminary Results

Duane A. Lundervold and Angel L. Dunlap

Abstract

Alternate forms reliability of the Behavioral Relaxation Scale (BRS; Poppen,1998), a direct observation measure of relaxed behavior, was examined. A single BRS score, based on long duration observation (5-minute), has been found to be a valid measure of relaxation and is correlated with self-report and some physiological measures. Recently, alternate forms of BRS observation have appeared in the literature; however, it is unknown if alternate forms are reliable relative to the long form observation method. BRS data from 10 adults, taking part in research on Behavioral Relaxation Training (BRT), were examined. Correlation analyses of long form BRS scores, interval-by-interval BRS (very short form: one 60-second; short form: two 60-second; medium form: three 60-second intervals) and composite BRS scores obtained from a single 120- or 180-second observation were conducted. All alternate forms BRS observation methods were robustly associated with long form BRS scores ($\underline{r} = \geq .80$, $p = .005$). Alternate forms BRS observation methods provide more flexibility in applied situations without loss of reliability when measuring overt relaxed behavior. Further research needs to examine reliability of alternate forms BRS observation methods using physiological measures and direct observation measures as criterion variables and clinical populations.
Key words: Relaxation training, Behavioral Relaxation Scale (BRS), Behavioral Relaxation Training (BRT).

Introduction

Relaxation training has a long history in behavior therapy and behavioral medicine. More recently relaxation has been advocated as a component of applied behavior analysis interventions for individuals with developmental disabilities as a means to manage anxiety and challenging behavior (Lindsay, Baty, & Michie, 1989; Mullins & Christian, 2001; Paclawskyj, 2002). The most well known method is Jacobson's classical progressive relaxation (PR) training (Jacobson, 1938; 1970). Wolpe (1958), followed by Paul (1966), abbreviated PR and incorporated it into systematic desensitization. In so doing, PR training was now more easily used in applied settings. Bernstein and Borkovek (1973) standardized abbreviated PR by means of manualization. Regardless, each method of PR targets a reduction in physical tension. Benson (1975) hypothesized that all relaxation procedures result in a general effect of decreased autonomic arousal. Davidson and Schwartz (1976) suggested that cognitive and somatic domains are altered following relaxation. Poppen (1998) conceptualized relaxation as a complex response class involving motor, visceral, observational responses and verbal behavior. Motor behavior involves action of the skeletal muscles. Visceral responding is concerned with homeostatic functions including breathing, temperature, and muscle tension. Observational responses seek out stimuli in the environment (e.g. a quiet park setting) or generate discriminative stimuli (e.g., "seeing" a quiet park setting). Verbal behavior is concerned with overt or covert vocal behavior (e.g., "I am tense") in relation to relaxed behavior. Because multiple modes of responding are involved in relaxation, each mode is in need of assessment to determine the unique and interactive effect of relaxation training procedures on each response channel.

According to Poppen (1998), assessment of actual relaxation is rarely done. The verbal component of relaxation is assessed by simply asking, "How do you feel?" which may be combined with a numerical rating. This question appears to assess what Smith (1999) refers to as a relaxation state (R-

State), "a psychological state of mind associated with practicing relaxation and mastering the act of sustaining passive simple focus (p. 5)." Crist, Rickard, Prentice-Dunn, and Barker (1989) developed a 45-item relaxation inventory used to assess the feelings and sensations of relaxation. As pointed out by Poppen (1998), verbal report of relaxation may be influenced by the social contingencies of the training situation as well as the covert stimulus about which the trainer is inquiring. Furthermore, research has indicated that verbal report of the extent of relaxation is not differentially sensitive to training or control procedures and is unrelated to physiological measures of decreased arousal (Schilling & Poppen, 1983). Visceral responding, for example, peripheral temperature, is typically assessed using instruments. Assessment of the motor response component of relaxation has been neglected even though it is the primary mode of behavior under instruction.

Only two instruments have been developed to assess the motor response component of relaxation. Luiselli (1980) developed the Relaxation Checklist to be completed by raters after relaxation training; however, there are no data on its validity. As part of Behavioral Relaxation Training (BRT) procedures (Poppen, 1998), relaxed behavior is assessed using the Behavioral Relaxation Scale (BRS), a partial interval direct observation recording system (Lundervold & Poppen, 2004; Schilling & Poppen, 1983; Poppen, 1998). Typically, a 5-minute observation is conducted during which the behaviors are observed and recorded within each 60-second interval. During the first 30-seconds of each interval breathing is counted. In the next 15-seconds the remaining nine behaviors are observed. The final 15-seconds are used to score the behaviors as relaxed or unrelaxed. The BRS (and the behaviors that comprise the BRS) have been shown to be a valid measure of relaxation (Norton, Holm, & McSherry, 1997; Schilling & Poppen, 1983; Poppen & Maurer, 1982).

The BRS has been repeatedly used in research employing BRT using the recommended observation procedure (Chung, Poppen, & Lundervold, 1995; Lundervold & Poppen, 2004; Raymer & Poppen, 1985; Schilling & Poppen, 1983). A percent-relaxed score is calculated based on the entire 5-minute observation period. Inter-observer agreement, a measure of the extent to which two observers simultaneously and independently agree on the occurrence of a behavior, for traditional BRS observation is uniformly very good. Poppen (1998) further recommends that repeated 15-minute baseline observations and 5-minute post training observation of relaxed behavior be conducted. Such long baseline conditions and observation periods may be difficult to conduct in applied settings.

Recently, alternate forms of BRS observation have appeared in the literature. A study evaluating the effect of progressive relaxation with a child with autism and aggressive behavior used an alternate form of BRS observation (Mulllins & Christian, 2001). The BRS was used to assess the effects of progressive relaxation using one 60-second observation (very short form). Medical settings are known to be especially fast-paced work environments and conducting long baseline observations is unlikely. Behavior analysts working in such environments must be able to change their behavior to be successful in such contexts yet obtain valid data (Strasahl, 1998). Lundervold, Pahwa and Lyons (2005; In press) reported the use of Behavioral Relaxation Training for Parkinson's disease-related anxiety disorders. In these studies, observation periods ranged from two to four minutes with BRS scores calculated on an interval-by-interval basis. By altering the duration of the observation period from the standard established and used in past research (Poppen, 1998), Mullins and Christian and Lundervold et al have essentially employed the use of an alternate form of the BRS.

According to Thorndike (1991), alternate forms of tests (observations) are forms of assessment designed according to the same specifications but comprised of separate samples of the behavior to be assessed. Alternate forms of tests or observation must demonstrate that they are reliable with the standard, long form on which they are based (Thorndike, 1991). The length of the observation (test) can significantly influence reliability assuming that the behavior measured is the same. Neither Mullins and Christian or Lundervold et al provide evidence of the reliability of alternate forms BRS observation

methods relative to the long form BRS. Cone (1998) has advised behavior analysts to integrate traditional psychometric concepts into behavioral assessment to the extent that they are appropriate. Given that past research (Norton et al, 1997; Schilling & Poppen, 1983; Poppen & Maurer, 1982) demonstrated the validity of the BRS using long form observation methods, it is important to establish that alternate forms BRS observation are correlated with the long form BRS. Doing so would enable rapid collection of baseline data regarding relaxation using less time consuming alternate forms BRS observation procedures and swift transition to intervention phases. The purpose of this research was to examine the relationship between long form and alternate forms BRS scores obtained from observation periods ranging from very short (60-seconds) to medium (180-seconds) duration.

Method

Participants

Data from 10 adults (range 18-44; mean age 33.5, sd 14.8 years**)** taking part in Behavioral Relaxation Training based research were analyzed. All participants were cognitively intact and 70% were female. Consent was obtained from all participants before taking part in the research. One participant was taking part in applied research on chronic pain management.

Variables

The Behavioral Relaxation Scale (BRS) is a direct observation measure of 10 overt relaxed behaviors using a partial interval, time sampling procedure (Poppen, 1998). Each of the 10 behaviors are repeatedly observed and scored over consecutive 60-second time periods. The criterion variable was the BRS score indexed as percent-relaxed behavior and based on a 5-minute (300-second) observation interval (Poppen, 1998).

Design and analysis

A group design employing bivariate correlation was used. Pearson correlation coefficients were calculated examining the relation between BRS scores obtained during observation periods of differing duration. In essence, the analysis examined the reliability of very short, short, medium, and long form BRS scores.

Procedure

BRS scores for each participant based on very short (60-second), short (120-second), medium (180-second), and long forms (300-second) of observation were calculated and extracted from the existing data. All scores were obtained from the first session that a BRS score was obtained. Long form BRS scores were calculated by dividing the number of relaxed behaviors by the total number of relaxed and unrelaxed behaviors (N =50) multiplied by 100 (Poppen, 1998). Very short form BRS scores (number of relaxed behaviors/10 x 100) were calculated for each participant using the first interval of observation. Short form (i.e., two BRS scores, one each for the first two intervals) and medium form BRS scores (i.e., three BRS scores, one each for the first three intervals) were calculated. In other words, the BRS score for one 60-second interval was based on a single observation of 10 behaviors. For a 120-second observation, two BRS scores were calculated, one for each consecutive 60-second interval. Within the 180-second observation, three consecutive BRS scores were calculated, one for each 60-second interval. A single BRS score was calculated based on a 120-second observation interval (composite short form; number of relaxed behaviors/20 x 100) and 180-second interval (composite medium form; number of relaxed behaviors/30 x 100). Composite BRS scores were correlated with long form BRS scores.

Results and Discussion

Interval-by-interval BRS scores obtained using the very short form (one 60-second interval observation) were strongly associated with the long form (300-second) BRS score (r = .93, p = .001). Similarly, BRS scores based on short (two, 60-second interval observations) and medium form (three, 60-second interval observations) methods also were strongly associated with long form BRS scores (r = .93, p = .001). Finally, composite BRS scores using one 120-second interval (r = .90, p = .01) or a 180-second interval (r = .80, p = .005) were robustly associated with long form BRS scores.

The importance of these preliminary findings lies in the increased flexibility of observation methods used with the BRS in applied settings. Because interval-by-interval BRS scores (very short and short form methods) have been shown to be reliable, these scores can be used to determine baseline levels of relaxed behavior. Rather than three sessions being conducted over three weeks of observation as is the current case, short form BRS observation methods allow clinical behavior analysts to conduct one 3-minute observation and reliably determine data trend. More rapid, evidence-based provision of relaxation training is possible. Preliminary results suggest that shortened forms of BRS observation are strongly related to BRS scores obtained over the traditional 5-minute observation recommended by Poppen (1998) and used in research.

While encouraging, results were obtained with a small, largely non-clinical sample. It is well known that results of analog research may not be generalizable to clinical populations. Results must be interpreted very cautiously. In addition, no physiological measures were obtained to provide concurrent validity of abbreviated forms of BRS observation. Replication of this research utilizing a larger clinical sample as well as incorporating use of physiological measures is needed.

References

Benson, H. (1975). *The relaxation response* . NY: Morrow.

Bernstein, D. A. & Borkovek, T. D. (1973). *Progressive muscle relaxation*. Champaign, IL:Research Press.

Chung, W., Poppen, R., & Lundervold, D. A. (1995). Behavioral relaxation training for tremor disorders in older adults. *Biofeedback and Self-Regulation,* 20, 123-135.

Crist, D. A., Rickard, H. C., Prentice-Dunn, S., & Barker, H. R. (1989). The Relaxation Inventory: Self-report scales of relaxation training effects. *Journal of Personality Assessment,* 53, 716-726.

Cone, J. D. (1998). Psychometric considerations: Concepts, contents and methods. In A.S. Bellack & M. Hersen (Eds.), *Behavioral assessment (4th ed.)(pp. 22-46).*

Davidson, R.J. & Schwartz, G.E. (1976). Psychobiology of relaxation and related states: A multiprocess theory. D.I. Mostofsky (Ed.), *Behavioral control and the modification of physiological activity* (pp. 200-233). NY: Free Press.

Jacobson, E. (1938). *Progressive relaxation* (2nd Ed.). Chicago: University of Chicago Press.

Jacobson, E. (1970). *Modern treatment of tense patients*. Springfield, IL: Charles C. Thomas Publishers.

Lindsay, W.R., Baty, F.J., & Michie, A.M. (1989). A comparison of anxiety treatments with adults who have moderate and severe mental retardation. *Research on Developmental Disabilities, 10*, 129-40.

Luiselli, J. K. (1980). Relaxation training with the developmentally disabled: A reappraisal. *Behavior Research With Severe Developmental Disabilities,* 1, 191-213.

Lundervold, D.A., Pahwa, R., & Lyons, K. (2005a). Effect of Behavioral Relaxation Training on comorbid general anxiety disorder and Parkinson's Disease. *Manuscript submitted.*

Lundervold, D.A., Pahwa, R., & Lyons, K. (In press). Behavioral Relaxation Training for Parkinson's Disease-related anxiety and dyskinesia. *Cognitive and Behavioral Practice.*

Lundervold, D.A. & Poppen, R. (2004). Biobehavioral intervention for older adults coping with essential tremor and related disability. *Applied Psychophysiology and Biofeedback, 29,* 63-74.

Mullins, J.L., Christian, L. (2001). The effects of progressive relaxation training on the disruptive behavior of a boy with autism**.** *Research on Developmental Disabilities, 22*, 449-462.

Norton, M., Holm, J. E., & McSherry, W. C., II. (1997). Behavioral assessment of relaxation: The validity of a behavioral rating scale. *Journal of Behavior Therapy and Experimental Psychiatry,* 28, 129-137.

Paclawskyj, T. R. (2002). Behavioral relaxation training (BRT) with children with dual diagnosis. *NADD Bulletin, 5*, 81-83.

Paul, G. L. (1966). *Insight versus desensitization in psychotherapy*. Stanford, CA: Stanford University Press.

Poppen, R. (1998). *Behavioral relaxation training and assessment* (2nd Ed.). Thousand Oaks, CA: Sage.

Poppen, R. & Maurer, G. (1982). Electromyographic analysis of relaxed postures. *Biofeedback and Self-Regulation, 7,* 491-498.

Schilling, D. & Poppen, R. (1983). Behavioral relaxation training and assessment. *Journal of Behavior Therapy and Experimental Psychiatry, 14*, 99-107.

Smith, J.C. (1999). *ABC relaxation theory. An evidenced based approach*. NY: Springer.

Strosahl, K. (1998). Integrating behavioral health and primary care services: The primary mental health care model. In A. Blount (Ed.), *Integrated primary care (pp.139-168).* NY: Norton & Company.

Thorndike, R.M. (1991). *Measurement and evaluation in psychology and education (6th ed).* Upper Saddle River, NJ: Merrill/Prentice Hall.

Wolpe, J. (1958). *Psychotherapy by reciprocal inhibition*. Stanford, CA: Stanford University.

Author Contact Information:

Duane A. Lundervold
Behavioral Medicine and Biofeedback Laboratory,
Department of Psychology, Lovinger 1111,
Central Missouri State University,
Warrensburg, MO 64093.
Email:Lundervold@cmsu1.cmsu.edu.
